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REVIEWS.

Department of Geology and Natural Resources of Indiana, Twenty-fifth Annual Report. By W. S. BLATCHLEY, State Geologist, Indianapolis, Ind., 1900. Pp. 782. Maps and plates.

The current report deals mainly with the cement resources of the state. It opens with a short paper by the state geologist on Portland cement, a compilation treating of its history, uses, composition, process of manufacture, methods of testing, etc., together with a short history of the development of the industry in Indiana.

The report on the Lakes and Marl Deposits of Northern Indiana is the result of the joint work of the state geologist and Dr. George H. Ashley. It is a thorough report of some three hundred pages and is accompanied by seventy maps of individual lakes on which the marl deposits in their varying conditions of occurrence are represented by conventional signs. In the body of the text, full physiographic descriptions of the lakes are given, as well as the detailed economic geology of the marl deposits. The notes on the natural history of these lakes, which are appended to the descriptions, are of much interest to the student of botanical ecology.

It is found that a deposit of marl of a thickness of ten feet and covering 160 acres will supply a factory of 500 barrels daily capacity for 30 years. Such a supply is termed a "workable deposit" in the report. There are thirty-two lakes which have at least that much marl available. With improved methods of raising marl from deeper waters, the productive area of these lakes will be much enlarged, and there will be added to the number half as many more, whose deposits are for the most part under water of greater depth than ten feet, the present limit of accessibility.

In regard to the origin of the marl the authors do not attribute more than 1 per cent. to shells as a source. The immediate source they believe to lie in the calcareous matter of the glacial clays which reaches the lakes in the form of the soluble double carbonate, $\text{CaH}_2(\text{CO}_3)_2$. This is believed to be carried by subterranean rather than superficial streams, because the marl deposits are found in

association with sub-lacustrine springs, while the mouths of streams and the currents leading away from them are marked by deposits of muck and silt. Calcium carbonate (CaCO_3) will be deposited if by any means CO_2 be withdrawn from the double carbonate. The authors recognize three such means.

1. Increase in temperature from mingling with the warmer lake waters.

2. Decrease in pressure as the spring water rises to the surface.

3. Extraction by aquatic plants, such as stoneworts, etc.

Since more than half the marl lakes do not have the stoneworts in abundance, and since the marl in general does not show that large percentage of organic matter which is shown by marls deposited through the agency of the stoneworts, the authors are inclined to minimize the part of aquatic plants.

As the spring water is colder than the lake water and denser owing to the carbonate in solution, we can see no cause for the rise of the spring water, except diffusion, in which the CO_2 released by ascending waters would be just balanced by that taken into solution by the descending currents.

If the main dependence is to be put upon the first means for removing the CO_2 , *i. e.*, increase of temperature, it seems to us that springs which emerge superficially in the neighborhood of the marl lakes would have their waters warmed more rapidly than sub-lacustrine springs, and should thus have copious deposits of marl. No reference is made to such deposits. We believe a competent theory for the deposition of the marls is yet to be found.

The state is to be congratulated on the timely appearance of this report and will reap the benefits which accrue from early occupation of the field.

"The paper on the 'Silver Creek Hydraulic Limestone,' by Mr. C. E. Siebenthal, contains full details regarding the location and stratigraphy of the stone so largely used in southern Indiana for the manufacture of natural rock cement, as well as an historic, descriptive, and statistical account of the industry. It is accompanied by a map showing the exact location of the cement rock."

Of the Bedford limestone¹ there was quarried in 1900 some 7,035,000 cubic feet, with a value of \$1,699,649.

¹ The article on this subject contributed to the current report by the writer, was made to read "Indiana Oolitic Limestone," without the consent or knowledge of the author.

From the report of the state mine inspector we learn that the production of coal in 1900 reached the largest figure in the history of the state, being 6,351,976 tons, valued at \$4,883,024.18.

In a paper on the petroleum industry, the state geologist supplements his articles in the Twenty-first and Twenty-second reports, by noting recent developments in the main Indiana field, as well as in several smaller fields recently exploited. The paper is accompanied by a map of the field. The oil and gas reservoirs of the state are found to be mainly in the porous dolomitic upper portion of the Trenton limestone which does not appear at the surface anywhere in the state. The author conceives the dolomitization to have resulted from the concentration of sea water in the shallow indentations of the coast or marginal lakes, with resulting substitution of magnesium for calcium in the rock below. The total production of oil in 1900 was over 5,000,000 barrels, valued at about \$5,000,000, one dollar per barrel.

The last paper in the report is from the pen of Dr. E. M. Kindle, and is entitled, the "Devonian Fossils and Stratigraphy of Indiana." It is one of the most important contributions which has ever been made to the knowledge of the paleontology of the state, and, with the exception of Dr. Foerste's work on the Silurian, is the only attempt which has been made to systematically explore the faunas of a group of Indiana rocks.

The first part of the paper takes up in detail the stratigraphy of the various localities, and discusses their faunal relations and correlation. The discovery at Delphi, Ind., of a new fauna in the New Albany shale leads Dr. Kindle to regard that formation as the western equivalent of both the Portage and Chemung, instead of the latter alone. Another interesting fact is that the Devonian limestones, which are well differentiated into the Sellersburg beds and the Jeffersonville limestone in the southern part of the state, give way to the dolomitic Geneva limestone and the Pendleton sandstone in the middle area, but resume their double facies again in the Wabash region, noting, however, that the Sellersburg beds hold very different faunas in the two regions.

The second part of the paper deals with the paleontology of the Devonian beds. The specific descriptions are preceded by keys for the discrimination of the species attributed to each genus, and these, taken in connection with the thirty-one excellent plates, comprising more than three hundred figures, make the paper an exceedingly useful handbook of this formation, particularly for Indiana students.

C. E. SIEBENTHAL.